

**X. APPENDIX**

1. An optical system for producing an image of the surface of an object, said object having a characteristic, temperature-dependent, dominant, self-emitted EMR spectrum, comprising:

an EMR source for projecting electromagnetic radiation toward said object;

an EMR detector for selectively detecting a spectrum component of said projected EMR, said component being reflected by the surface of said object and being directed toward said EMR detector;

wherein said reflected component of said projected EMR has a wavelength different than said self-emitted, dominant EMR spectrum such that the reflected component can be distinguished from said self-emitted EMR based on wavelength, said projected electromagnetic radiation having a wavelength which is selected as a function of object temperature and material.

2. An optical system as recited in claim 1, wherein the optical system includes a video recorder.

3. An optical system as recited in claim 1, wherein the EMR detector is a charge coupled device.

4. An optical system as recited in claim 1, wherein the EMR source is selected from the group consisting of metal-halide lamps, florescent lamps, and xenon lamps.

5. An optical system as recited in claim 1, wherein the EMR source is a laser.

6. An optical system as recited in claim 5, wherein said laser projects a zone illumination.

7. An optical system as recited in claim 5, wherein said optical system further includes a mirror set to direct said projected EMR.

8. An optical system as recited in claim 5, wherein said laser projects structured illumination.

9. An optical system as recited in claim 1, wherein said detector detects multiple wavelengths of reflected EMR.
10. An optical system as recited in claim 3, wherein said charge coupled device is sensitive to wavelengths from 175 to 1000 nm.
11. An optical system as recited in claim 1, wherein said optical system further includes an interference filter in association with said EMR detector.
12. An optical system as recited in claim 11, wherein said interference filter blocks substantially all of said self-emitted EMR.
13. An optical system as recited in claim 1, wherein said optical system further includes a cut-off filter in association with said EMR detector.
14. An optical system as recited in claim 1, wherein said optical system further includes an airflow controller to provide air at a preselected temperature around said hot object to decrease a temperature gradient to said object to remove air density distortion.
15. An optical system as recited in claim 1, further including a frequency modulator in association with said EMR source for modulating the frequency of said projected EMR and further including a demodulator in association with said EMR detector.
16. An optical system as recited in claim 1, further including a means for pulsing said projected EMR.
17. An optical system as recited in claim 1, wherein said EMR source is a plurality of EMR sources.
18. An optical system as recited in claim 1, wherein said EMR detector is a plurality of EMR detectors.
19. An optical system for producing an image of the surface of a hot object, said object having a characteristic, dominant, self-emitted EMR spectrum, comprising:
 - a video camera;
 - an interference filter in association with said video camera for blocking substantially all of said self-emitted EMR spectrum; and

a light source attached to said video camera_configured to project electromagnetic radiation containing one or more wavelengths which are selected as a function of object temperature and material so that said one or more wavelengths are different than wavelengths contained in said self-emitted, dominant EMR spectrum such that the reflected component can be distinguished from said self-emitted EMR based on wavelength.

20. The optical system of claim 1 wherein said projected EMR impinges a predetermined surface area of said hot object, said EMR detector being configured to detect said spectrum component being reflected by said predetermined surface area of said hot object.

21. An optical system for producing an image of the surface of an object, said object having a characteristic, temperature-dependent, dominant, self-emitted EMR spectrum, comprising:

an EMR source for projecting electromagnetic radiation toward said object;

an EMR detector for selectively detecting a spectrum component of said projected EMR, said component being reflected by the surface of said object and being directed toward said EMR detector;

an airflow controller to provide airflow at a preselected temperature around said hot object to decrease a temperature gradient to remove air density distortion; and

wherein said reflected component of said projected EMR has a wavelength different than said self-emitted, dominant EMR spectrum such that the reflected component can be distinguished from said self-emitted EMR based on wavelength.

22. The optical system of claim 21 wherein said preselected temperature is such that a temperature distribution of said hot object is not influenced adversely by said airflow.